DESIGN AND IMPLEMENTATION OF A MULTIMEDIA DATABASE APPLICATION SYSTEM

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ABSTRACT

With the development of Internet technology, the number of the network users becomes more and more, and computer networks has to deal with an amazing amount of information every day. With database management system (DBMS) being used widely, many people put up with the multimedia extensions, for example, the multimedia technology which is based on the original vehicle. However, as for the meaningful queries for multimedia data semantics, these extensions are shortage of the methods to manage advanced indexing, content modeling and multimedia programming library. In this context, this paper introduces the mpeg-7 multimedia database system , pointing out that the innovative part of the system is dependent on xml meg-7 standardized meta-data model , a new mpeg-7indexing and query system , designing application libraries which have query optimization and support internality and externality .Then it analyzes the expansion of the Oracle system , validates and demonstrates the two real multimedia applications that are applied in the field of audio recognition and image retrieval.

Keywords: *Networking Technology, Multimedia database, Mpeg -7, Metadata Model*

1. INTRODUCTION

Multi-media database management system (MMDBMS) is mainly used for the retrieval and storage of the multimedia data content .The development of the multimedia system is dependent on the application of multimedia data model , such as inserting, index, query and retrieval, etc. In recent years, many researchers have designed the multimedia data model , but these models have some drawbacks[1]:Some of them are limited to the use of a multimedia data , such as they only have image support; or they have capacity limitations, such as only a keyword inserting in it can describe the content. The recent alarming results are that Martinez has released a new multimedia data standard which is used to describe different types of content , this label provides a richer semantic than existing systems, namely, it is mpeg -7,the first one that dose not fully process the coding standard Moving Picture Experts Group. In order to use the query , index and store multimedia, we develop and use the mpeg -7. This paper describes the innovative aspects of our designed multimedia database system and explains the mpeg-7 database schema , a multimedia query system , multimedia indexing framework to support multimedia similarity search and designs the query optimizer, which can be used to support a number of real-world multimedia application design .

Of course, the traditional database is based only on data storage and other functions, but the present stage, multimedia database is a collection of text, pictures, video and audio, not only has large storage space, and the forms is diversification, achieve better results of visual and auditory, And multimedia database can integrate different kinds of series of media and has unification supervision, integrate , process and apply the complex multimedia and maximum its advantage[2].But at this stage, the application of network technology under the background of multimedia application is becoming more and more popular, but the progress and development of multimedia database technology supported these multimedia operation application system is relatively slow, and the traditional system at this stage also is directed specifically to the specific use and development. Therefore, the text is the research of application model of multimedia database based on computer network technology, so that people can guide the application for multimedia database , having practical significance[3].

At present, a large number of image information are the precondition of trades, like the e-commerce website and shopping mall site. In order to find a specific image, image database engines and webpage search engines are usually used. However,

the retrieval ability of the engines are quite limited, especially on the web site[4]. With the rapid development of the Internet technology, the number of Internet users and the amount of the Internet multimedia information is growing. An intelligent network image retrieval system is proposed in the paper. The system architecture, the texture and the color image classification and the retrieval technology is proposed based on the user usage model , and through the provision of the keywords, select one or more sample texture pattern, The keywords are the color values which designated by the position of the color, or are based on the factors in a combination of some keywords or combined all.

Based on the multimedia information technology ,an intelligent network image retrieval system is built in the paper. Many image retrieval systems, such as safety, photo albums, can only dependent on keywords search and some support for contents search[5]. In the image retrieval based on content, they support the image retrieval based on the image features information, such as the average color, the histogram, the texture and the shape of objects. However, most of them build up based on the application of the developed image databases.

This paper briefly describes the mpeg-7 system and its innovative part, describes the function and the roles of the system, demonstrates the model mapping strategy that mpeg -7 is up to an equivalent database. Next, it introduces multimedia query system , and discuss the advantages and disadvantages of its services. And query and indexing system are evaluated through two practical application that demonstrates mpeg-7 in the MMDB ,at last, the paper does summarize and gives some suggestions to the outside work.

2. THE INTRODUCTION OF THE MPEG-7 RELATED CONTENT

Because computer network has a large number of multimedia data, we must consider how manage and retrieve these data .Most of the existing database management system (DBMS) is substantially not used for multimedia. Therefore, they only provide the basic processing multimedia data - Oracle vehicle , such as IBM DB2 Extenders2 and IBM Informix DataBlades3 , another example is that Oracle Multimedia provides the image storage , content - based retrieval (CBR) function and the format conversion by a new type of data[6]. However , these systems have great limitations , only relying on low-level features, which can not create

semantically rich query . In addition , this query does not mean that it gives reasoning to the video and audio.

Mpeg-7 is an IMPEG (movie released Expert Group)that is released by SO/IEC, the first version is designed in 2002 , the second version proposes the concept of community of users and developers with the description of the improvements, which is available since 2006 .Standards organizations have 10 parts and provides a rich set of standardized tools to describe multimedia content .

3. SYSTEM OVERVIEW

Mpeg 7 MMDB is an extension of the Oracle DBMS, which is based on its cassette data technology, Oracle database derives form a modular architecture extension. The scalable service database is extended by designers and programmers, which contains in query processing or data index (Figure 1) . Each service can be extended to provide a scalability.
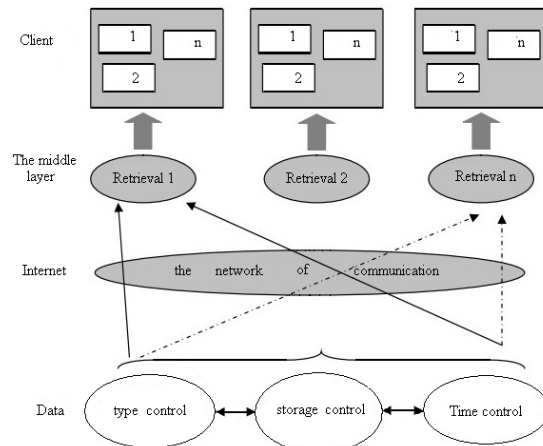

Figure 1: The Sketch Map Of System

3.1 The system of the core management

The system of the core management is based on mpeg-7 multimedia database schema which designs multimedia query optimization and indexing process .Multimedia database mode depends on the types of cartridges environment of the scalable system .For this purpose , MPEG -7 mode is mapped to a database schema , i.e, the type of the object and the table .The index processes available types of the interface index . Its main task is to parse , control and conversion input access (PL / SQL), and it puts into effect in the multimedia indexing framework (MIF) , as shown in Figure 2.

The storage and transmission of video of the system of the core management uses a clustering

algorithm , it is characterized as a unified formula[7,8] :

$$Mi(i+1) = \frac{m(JLi, JLi+1)}{\sum_{i}^{n-1} m(JLi, JLi+1)} \quad (1)$$

The distance between the two images , being similar to[9] :

$$Mi(i+1) = Mic + Mit + Mish + Misp \quad (2)$$

Assuming that the video density is P, then the following formula is[10]:
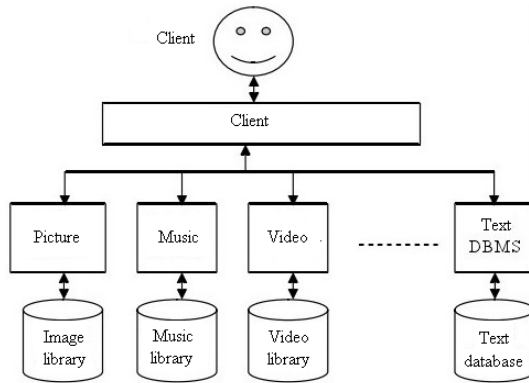

Figure 2: Core Management System

$$Q = \frac{N}{L} \quad (3)$$

Here N is the video image frames, L is for video length , the greater Q is, the greater the density of video will be, and thus the description of the video content is more abundant . The relationship between the video content and video density can be seen in Table 1:

Table 1: The Relationship Between Video Content And Video Density

The content of video	The total time of video	The frame number	Q Value
The news broadcast	2000	500	0.25
Chorus contest	2500	200	0.08
Teachers' teaching video	1000	45	0.045

From Table 1, we can see that though news network sustains not a long time, the number of frames extracted from it is much more, indicating the higher density the video has, the quality is better .The teaching video lasts a long time , but

the number of frames extracted from it is relatively small .In order to evaluate the density of the other videos , we can add the Q as a reference value , N as the divisor , the final classification of a video, in order to reflect the impact of decreasing the decimal point, which is multiplied to 1000 times in the formula, the final result[11]:

$$T = 1000 \times \frac{Q}{N} \quad (4)$$

3.2 Multimedia Indexing Framework (MIF)

The system of the core management of the index is erected that is based on framework (MIF) .MIF provides a variety of index structure , balanced index tree SR, SS tree and non - tree index, which is used for fast execution of similar and accurate search, which like a stack of documents .The main part is GistService , it is located in an external address space .It manages all the available access methods .

3.3 Application Library

The applications library refers as the interface between the application mpeg7 and MMDB .In general, these libraries underlay internal library in order to specify the need , for example, QueryLib is used to create application-specific query etc. We provide the following applications to achieve the library. That is to asy, the image retrieval application of Blob world is based on the audio recognition tools of AudioLib.

3.4 The Construction Of Multimedia Database Model

Multimedia database is mainly based on the XML, thereby achieve the function of integration of database resources, sharing and mutual operation, and Web constructed and based on this also has the very strong practical benefits and value[12].The paper is the model of multimedia database based on the XML technology to construct , the core technology facing in the multimedia database model construction process and how to realize the effect methods has fully research and analysis, which can be shown in Figure 2.
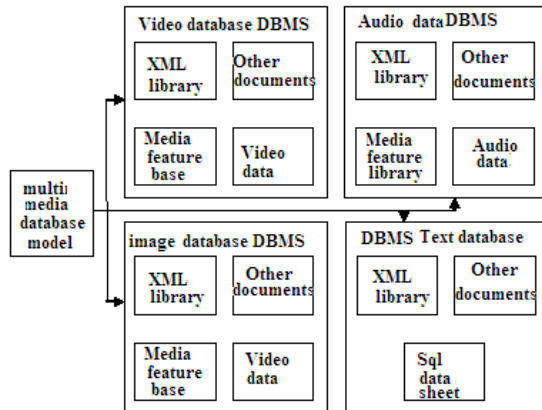
Figure 3: The Diagram Of Multimedia Database Model

Due to a variety of types of information data, the XML usually is flexible and simple, but it also needs a concrete analysis for concrete problems. Database XML library based on the text, video, audio and image is used for other management documents and the unified management of media feature library (except for the text database).The first establish a connection between the unity of a particular resource locator (URL) and the web server. Database application program accessing from the Web server will send to the Web browser through the HTTP (Hypertext Transfer Protocol) way, at the same time as the way of HTML to display, the user needs to send search in the way of HTML form and other requests to a web server, and then the professional section in the server establish communication applications, users are convenient to search and query the database, then edit the HTML page, thereby realizing the effective allocation and regulation of multimedia database resource .

4. THE CASE OF THE APPLIED SYSTEM

Mpeg-7 MMDB involved in this paper provides layering technology, a wide range of functions and the methods of entry, they have a different degree of complexity, such as the development of the index, the optimization of the query, and similarity algorithm,mpeg-7 establish queries and development application. We can distinguish three levels of usage : applied use , complicated use and management, the following example is to better understand our scene .Suppose a user wants to watch a football game which provides a new target detection applications that is based on our mpeg-7 MMDB[13] .Audio recognition of this

application ,for example the detection target is a football game screams , the similarity of research, such as a video sequence shows a restricted area and identifies the text annotation in the video sequence .In the scene of management , the user must be responsible for the maintenance of internal libraries and the system of the core management . In our example, multimedia indexing framework can be extended and the new index can be integrated into the MPEG - 7MMDB for complexed scenes. In addition , the user can extend the collection of the internal library , such as it can extend the mode of db by the function of a database update as well as through new internal data type .The following section provides an important part of the detailed information system.

The system of the core management at the top resides several internal database which is dependent on the core components, an internal inserts into mpeg-7 document database .Its task is to obtain and perform the mode of the SQL insert statement. Therefore, it depends on the mode of dB , letting us illustrate the most important step that the document is inserted into in our example of figure 3.The basic idea is to perform a post-order traversal document DOM tree , which is to help to create a corresponding XML parser .The definition of a leaf node has no more sub-elements such as Free Text Annotation (Note: The text elements does not mean that as an XML Type nodes) or MediaLocator that is inserted in all child elements. In addition to the XML Type and the basic types , such as the process of insertion of integrating: the type of REF represents a point in a bank database reference .

Figure 3: The Instance Of Inserting The Document

5. THE ESTABLISHMENT OF MULTIMEDIA DATABASE MODEL IN COMPUTER NETWORK TECHNOLOGY

By using MS SDL Servers software to install, and then the way of management menu graphical through the direct use of SDL En-97sterprise build multimedia database, documents, tables and other database contained objects. At the same time, it also can use the tool command window to complete the work of data writing .After building multimedia data table, start the next task, the multimedia data will be stored in the database.

The access of experiment and time data by SDL Server is a set of specific procedure function, specific procedure function is as follows[14]:

(1) the database table format: image and text (ptr-text) function is: because it is 16 bits binary , so return text and image pointer value ,

(2)reading format: read[owner] column table-name. image/text ptr-offset Lize read[owner] in text .The program features is: read the numerical value between the image and text columns.

(3) writing format: write[owner] column table-name image/text ptr-value in text. The program functions is: input between the number of image and text columns .

The application program for multimedia client connect the multimedia database through USB interface, the application of function complete the tasks of multimedia data access . As a kind of data application development tools for the study-VB , the operation of using database tool is relatively simple and can be used as a good data development tools. At the same time, applying a common database call function in the process of using VB tool , namely Exexutes-SDL and Open-Database into calling function finish the task for connecting the data source .

When implement program statement of multimedia data at work, the key sentences of multimedia database operation is[15]:

```
 Sets:
 SDL DB = OpenDatabases;
 If   DNS  =  NTSFV;  Database
=main;YID=sa;PRD=False")
  onnect  to ODBC data source
  While  NOT=EOF;
read   the   image   and   document
multimedia,  and  converting  it  into
program code of multimedia text ;
 Chara=hexs$(Asd(Input))
 IdgSyr=IsgStr&Switchs(char=1/2)
 SDLSyr="declares      @     vall
valvarbinary(17)"
 SDLsyr=sdlstrs      &"selects      @
vall=textptr(image coll)
```

```
from   duomeitid"   SDLsyr=sdlstrs
&"where names='ligiang'
 SDLsyr = sdlstrs & "
 write  texts  duo  meitid.image  coll
@vall 0x"ImgStrt=SDL DB.Executes
```

The algorithm will store multimedia teaching information in a multimedia database, finish the task of model establishment of multimedia database.

6. CONCLUSION

This paper describes the mpeg-7MMDB and the support of the Mpeg-7database system in the expansion of Oracle DBMS. It allows us to insert , query , and retrieve multimedia data .The core of the system is the mode of the mpeg-7 multimedia , this mode maps the types of the mpeg-7DDL (The definition of the data language) database and XMLTypes. This is the first time to be seen as the mode of the mpeg-7DBMS, therefore , the mode of the mpeg-7 that is possible to inquirer all parts, such as for senior inquires, which is to be a particular person or thing , another example is that it is connected with the query of a cbr , the query is similar to the color .Work in the future , it should be enhanced to support the format of the MPEG query (MPQF)and the mode of MMDB mpeg-7. The system of the multimedia retrieval can prevent the polymerization of clients when they are in a variety of multimedia database services .Therefore , MPEG standardization committee decides to start this work as a format o the general query. This model should be enhanced in the future ,the efficiency of high - quality the good multimedia database system is also be made.

REFERENCES:

[1] Adrien Depeursinge, Alejandro Vargas, Alexandra Platon, Antoine Geissbuhler, Pierre-Alexandre Poletti, Henning Müller, "Building a reference multimedia database for interstitial lung diseases, *Computerized Medical Imaging and Graphics*, Vol. 36, No. 3, 2012, pp. 227-238.

[2] Avi Arampatzis, Konstantinos Zagoris, Savvas A. Chatzichristofis, "Dynamic two-stage image retrieval from large multimedia databases", *Information Processing & Management*, Vol. 49,No. 1, 2013, pp. 274-285.

[3] Adrien Depeursinge, Alejandro Vargas, Alexandra Platon, Antoine Geissbuhler, Pierre-Alexandre Poletti, Henning Müller, "Building a reference multimedia database for interstitial

lung diseases", *Computerized Medical Imaging and Graphics*, Vol. 36, No. 3, 2012, pp. 227-238.

[4]   San-Yih Hwang, Wan-Shiou Yang, Kang-Di Ting, "Automatic index construction for multimedia digital libraries",*Information Processing & Management*, Vol. 46, No. 3, 2010, pp. 295-307.

[5]   Zongda Wu, Guandong Xu, Yanchun Zhang, Zhongsheng Cao, Guiling Li, Zhiwen Hu, "Relevance feature mapping for content-based multimedia information retrieval", *Pattern Recognition*, Vol. 45, No. 4, 2012, pp. 1707-1720.

[6]   Bechara Al Bouna, Richard Chbeir, Stefania Marrar, "Distance browsing in distributed multimedia databases", *Knowledge-Based Systems*, Vol. 26, No. 11, 2012, pp. 135-143.

[7]   XiaozhiWang, "Enforcing role based access control model with multimedia signatures", *Journal of Systems Architecture*, Vol. 55, No. 4, 2009, pp. 264-274.

[8]   Michalis Lazaridis, Apostolos Axenopoulos, Dimitrios Rafailidis, Petros Daras, "Multimedia search and retrieval using multimodal annotation propagation and indexing techniques", *Signal Processing: Image Communication*, Vol. 14, No. 4, 2012, pp. 45-57.

[9]   Hua-ping Yao, Yu-zhong Liu, Chang-song Han, "Analysis of the Influencing Factors of Multimedia Technical Equipments on the 13th CUBA Basketball Match in Southwest Division", *ProcediaEngineering*, Vol. 29, 2012, pp. 4292-4296.

[10]   Claudio Gennaro, Rita Lenzi, Federica Mandreoli, Riccardo Martoglia, Matteo Mordacchini, Wilma Penzo, Simona Sassatelli, "A unified multimedia and semantic perspective for data retrieval in the semantic web", *Information Systems*, Vol. 36, No. 2, 2011, pp. 174-191.

[11]   Yuzhou Luo, Minghua Zhang, "Multimedia transport and risk assessment of organophosphate pesticides and a case study in the northern San Joaquin Valley of California", *Chemosphere*, Vol. 75, No. 7, 2009, pp. 969-978.

[12]   K.Elmagarmid, Walid G.Aref,Lide Wu., "ClassView:the classification,indexing and accessing of the hierarchical video shot ", IEEE transition of the multimedia, Vol. 6, No. 1, 2008, pp. 70-86.

[13]   Manuel J. Fonseca, Joaquim A.Jorge, Indexing high-dimensional data forcontent-based retrieval in large databases, IEEE Proc. of the 8th Int. Conf. on database systems for advanced applications, Vol. 3, 2011, pp. 267-275.

[14]   S. Kiranyaz, K. Caglar, E. Guldogan, O. Guldogan, M.Gabbouj, "MUVIS: a content-based multimedia indexing and retrieval framework", Proc. of the 3rd Int. Workshop on content-based multimedia indexing, 2009, pp. 405-412.

[15]   Lu Tiehua, Xu Linying, "The research of the system of the video database management that is based on Web", *Computer applications and software*, Vol. 21, No. 3, 2004, pp. 26-28.